

UNITED STATES  
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FOREST SERVICE

NORTHEASTERN AREA

Field Note 84-1

# ***FOREST PEST MANAGEMENT***

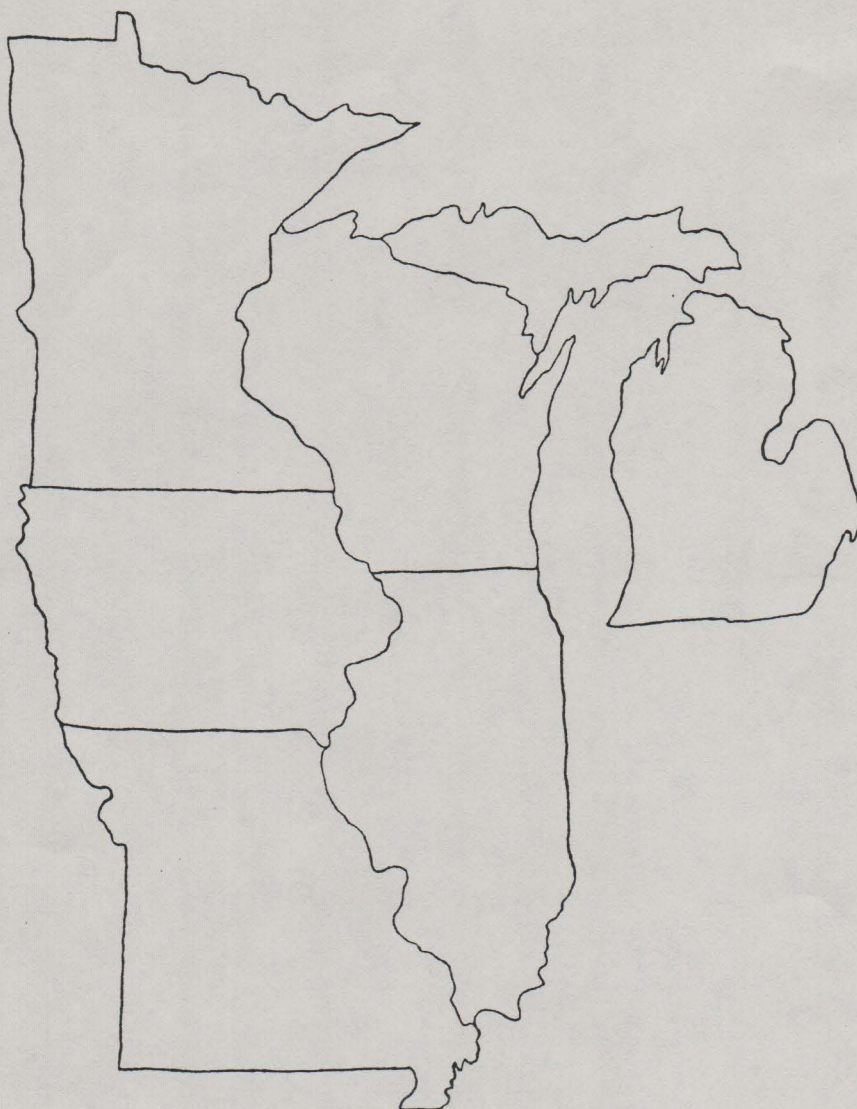
## ***1983 NURSERY REPORT***





1983 FOREST PEST MANAGEMENT  
NURSERY REPORT

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## INTRODUCTION

This report summarizes Forest Pest Management (FPM) nursery activities in the St. Paul Field Office area during 1983. The nursery work includes direct involvement with federal nurseries and cooperative projects with states, universities, and other federal agencies. The Field Office also responds to pest surveillance reports sent in by forest nursery managers within a six state area. Some of the 1983 nursery activities are described below:

- Arsenic toxicity to container grown red pine
- Evaluation of stunted white spruce field performance
- Evaluation of effects of fumigation and solar pasteurization on seedling production
- Evaluation of triadimefon for control of jack pine gall rust
- Evaluation of benomyl for control of Diplodia shoot blight 1-0 red pine seedlings
- Evaluation of walnut seed germination
- Evaluation of Fore® for control of honeysuckle leaf blight
- Nursery pest surveillance training session
- 1983 nursery pest surveillance reports

## ARSENIC TOXICITY TO CONTAINER GROWN CONIFERS

In July 1982, possible arsenic toxicity to paper pot container grown conifer seedlings was detected at the Red Lake Indian Reservation Greenhouse. Because the affected seedlings were uniformly arranged along the perimeter of each paper pot set, the source of the arsenic was suspected to be the chromated copper arsenate (CCA) preservative treated wooden frames that surrounded each set. Preliminary evaluations showed higher levels of arsenic in the tissues of seedlings growing near the perimeter of the set than those growing at the center of the set.

A formal evaluation was established to confirm these observations. Results of this evaluation demonstrated that arsenic levels in the 1982-83 winter red pine crop were similar to those reported for the 1982 summer crop. Red pine seedlings at the perimeter of the paper pot sets had elevated levels of arsenic. Seedling arsenic levels decreased as the distance from the preservative treated wooden set frames increased. Soil arsenic levels showed a similar pattern.

At eleven weeks following seeding, the perimeter seedlings in the wood preservative treated frames showed signs of needle burn and occasional mortality. The average height and weight of seedlings adjacent to the CCA treated set frames was less than that observed for seedlings in non-CCA treated frames. One week before the seedlings were removed from the greenhouse, cull for perimeter seedlings in treated frames was approximately 89 percent, while perimeter cull in the non-treated frames was 6 percent. The combined red pine production for the 1982 summer and 1983 winter crops was approximately 345,000 seedlings (648 frames). Because 83 percent of the 104 perimeter seedlings in each frame were culled due to arsenic toxicity, the dollar loss at the Red Lake Greenhouse for these two crops was \$6,153.



Although the evaluation of foliage and soil for arsenic content was limited to red pine, three other tree species, jack pine, white spruce, and black spruce, were also grown in preservative treated and non-treated set frames. Perimeter cull in the treated frames was 90, 83, and 75 percent, while corresponding figures for non-treated set frames were 6, 19, and 18 percent, respectively. Use of preservative treated frames increased cull in the four conifer species examined in this evaluation.

#### EVALUATION OF STUNTED WHITE SPRUCE STOCK FIELD PERFORMANCE

In 1978, a survey was conducted to determine the impact of stunting on white spruce production at Eveleth Nursery. Survey results showed that 28 percent of the stunted 1-0 seedlings were culled at the 3-0 stage due to small size, resulting in a \$9,800 loss to the nursery for the white spruce crop seeded in 1978.

Results also indicated that the average stunted seedling had attained only 78 percent of the height of non-stunted seedlings after three years in the nursery. If stunted seedlings continue to lag behind non-stunted seedlings after outplanting, financial losses would be even greater than the losses reported for the nursery.

To determine if the growth differential persists in the field, stunted and non-stunted graded 3-0 white spruce stock were outplanted on the Superior National Forest, Minnesota in April 1982. Both at planting and at the end of two growing seasons, stunted stock had significantly smaller mean shoot height than non-stunted stock. However, the initial difference in mean caliper could not be detected by the end of the second growing season. Although the final mean shoot height of the stunted group was smaller by 5.13 cm, this difference should not increase over time, as there were no significant differences between stunted and non-stunted seedlings for shoot growth or shoot growth rate. Clearly, a 5 cm difference would not be of consequence at rotation age. Based on these results, it appears the dollar losses to stunting of white spruce are limited to the nursery, where there are increases in percent cull due to small seedling size.

#### EVALUATION OF THE EFFECTS OF FUMIGATION AND SOLAR PASTEURIZATION ON SEEDLING PRODUCTION

A two year evaluation of the effects of solar pasteurization and vapam fumigation of soil was initiated in 1982 at the Iowa State Nursery in Ames. Reductions in Fusarium spp. populations were observed in both fumigated and pasteurized areas, however, these reductions were statistically significant in the fumigated areas only. Saprophytic nematode populations were reduced by 58 and 100 percent in the top 15 cm of pasteurized and fumigated areas, respectively. At lower depths (16-30 cm), there was a 5 percent nematode population increase for the pasteurized area and a 36 percent decrease for the fumigated area. Eight weeks after removing the tarps, there were fewer weeds in the pasteurized than in the control areas (weeds were not counted in fumigated areas).



The treated areas were seeded to red pine and white pine in November, 1982. Seedling survival and growth were evaluated in the fumigated, pasteurized, and control areas following the first growing season. No difference in seedling height, weight, or mortality were detected among the solar pasteurized, fumigated and untreated control areas.

Evaluation results indicate that solar pasteurization was not as effective as fumigation in reducing Fusarium spp. and nematode populations at the Iowa State Nursery. However, stock growth and survival were not improved by either fumigation or solar pasteurization as compared with the control areas.

#### EVALUATION OF TRIADIMEFON FOR CONTROL OF JACK PINE GALL RUST

The General Andrews State Nursery at Willow River, Minnesota recently experienced severe jack pine gall rust infection. Minnesota Department of Natural Resource personnel reported 70 percent cull due to obvious galls in the 1982 fall lifted 2-0 stock. As a result of these, and previous years' losses, Forest Pest Management was asked to work with Minnesota Forest Pest Specialists and nursery personnel to develop a protective fungicide program to be part of an overall gall rust control program. In June, 1983, Wisconsin Department of Natural Resource personnel reported losses to this disease and asked that the fungicide evaluation be expanded to include the Hayward State Nursery.

Galls typical of both pine-pine (Endocronartium harknessii (J.P. Moore) Y. Hiratsuka) and pine-oak gall rusts (Cronartium quercuum (Berk.) Miy.: Shirai) were observed on seedlings. As both diseases occur in the vicinity of the nurseries, it is possible that losses resulted from infections of one or both fungi.

Fusiform gall rust (Cronartium quercuum (Berk.) Miy.: Shirai f. sp. fusiforme Burdsall & Snow) in southern pine nurseries has been successfully controlled with applications of the systemic fungicide triadimefon (Bayleton®). Because fusiform and pine-oak gall rusts are caused by the same fungal species, it is probable that triadimefon will also control pine-oak rust. Although pine-pine gall rust is caused by a distinctly different fungus, it too has been reported to be controlled with triadimefon applications in California Christmas tree plantations.

A three year evaluation of a Bayleton 50WP application program for control of jack pine gall rust began in 1983 at the General Andrews and Hayward State Nurseries.

#### EVALUATION OF BENOMYL FOR CONTROL OF DIPLODIA SHOOT BLIGHT IN 1-0 RED PINE SEEDLINGS

Red pine losses due to Diplodia shoot blight (Sphaeropsis sapinea (Fr.) Dyko & Sutton) continue to be a problem in Lake States nurseries. Although Bordeaux mixture is available for control of this disease, the compound is difficult for nursery personnel to work with, as it corrodes spray equipment and does not stay in



suspension. North Central Forest Experiment Station (NCFES) personnel recently completed laboratory screening and field trials for several alternative fungicide programs. They found benomyl (2 lb. Benlate 50 WP per acre) gave good control on 1-, 2-, and 3-0 seedlings. However, the most serious economic losses to Diplodia shoot blight occur in 1-0 stock. A different spray schedule needed to be designed to protect 1-0 seedlings, since previous work indicated that seedling development and susceptibility in this age class does not correspond to that of older seedlings.

In 1983, FPM working in cooperation with NCFES personnel, established trials in 1-0 red pine beds at the Wilson Nursery, Boscobel, Wisconsin to evaluate the effectiveness of various application schedules at a lower benomyl rate (1 lb. Benlate 50 WP per acre) for control of Diplodia shoot blight. Due to low infection, it was not possible to assess the effectiveness of the various spray schedules. However, initial evaluation of the data suggests that the lower benomyl rate will give control. Further work is planned for 1984.

#### EVALUATION OF WALNUT SEED GERMINATION

Most nurseries producing black walnut report low (50 percent) germination rates. This low germination may be due to seed handling and storage techniques, and not to preharvest factors alone. Because walnut seed is expensive and often in short supply, developing seed handling and storage practices that maintain viability would benefit all growers.

An evaluation was initiated to determine if present walnut seed handling practices reduce germination rates. Germination rates of seed samples taken at 5 points during 1983 seed processing, from collection to sowing, are being compared. Reductions in germination rates during processing will indicate areas where handling techniques require improvement. This is a cooperative study involving the Minnesota Department of Natural Resources (DNR) and the USDA Forest Service, State and Private Forestry. Germination tests are currently underway at the National Tree Seed Laboratory in Georgia.

#### EVALUATION OF FORE<sup>®</sup> FOR CONTROL OF HONEYSUCKLE LEAF BLIGHT

The Iowa State Nursery in Ames experienced serious honeysuckle leaf blight (Herpobasidium deformans Gould) infection on tatarian honeysuckle (Lonicera tatarica L.) during the 1982 growing season. Fore<sup>®</sup>, a maneb-zinc based fungicide, is the only product currently registered for control of this disease. In 1983, S&PF worked with Nursery personnel and Dr. Laura Sweets, Iowa State University, to develop and evaluate a protective fungicide application schedule.

Infection was uniformly high throughout the study area. Results indicated that Fore applications did not provide seedling protection. However, due to excessive precipitation, intervals between the early



season fungicide applications were far longer than those recommended on the label. Therefore, it was not possible to draw a conclusion about the effectiveness of the compound in controlling honeysuckle leaf blight.

The precipitation that prevented nursery personnel from making regular fungicide applications, probably created the ideal environment for seedling infection. Because precipitation keeps nursery personnel from applying fungicides, and tends to wash protective fungicides off leaf surfaces, systemic fungicides should be evaluated in addition to Fore for control of H. deformans.

#### NURSERY PEST SURVEILLANCE TRAINING SESSION

Pest surveillance and detection by nursery personnel is the key to a successful nursery pest management program. Pest specialists should be called in when a pest is detected, but it is the people who are in the nursery beds daily that have the best chance of detecting a pest population before it erupts into a major problem. With this in mind, a nursery pest surveillance training program was initiated in 1983 in cooperation with Minnesota Department of Natural Resources. The goals of the program were to: 1) increase awareness of early signs and symptoms of pests before they reach epidemic proportions, 2) encourage nursery personnel to think about their role in nursery pest management, 3) increase nursery personnel familiarity with pesticide safety. The program was presented at the General Andrews and Badoura State Nurseries, Minnesota and is available to other nurseries who wish to strengthen their pest management program.



# 1983 NURSERY PEST SURVEILLANCE REPORTS

During 1983, 25 requests for diagnosis of nursery pest problems were received. The requests are listed below by nursery, host species, and pest:

NURSERY	TREE SPECIES	PEST/COMMENT
Badoura State Nursery, MN	Honeysuckle	Herpobasidium leaf blight
Eveleth, Superior NF, MN	White and black spruce	Shoot blight-unknown cause
General Andrews State Nursery, MN	Honeysuckle	Herpobasidium leaf blight
Great Northern Paper Co., ME	Black and red spruce container stock	Botrytis blight
Institute of Paper Chemistry, WI	European larch container stock	<u>Fusarium</u> sp. root rot
Iowa State, Ames, IA	Several species of pine	Diplodia shoot blight
	Red pine	Cutworms
	Black walnut	<u>Phytophthora</u> sp.
Itasca Co. Land Commission, MN	Red pine container stock	Heat injury
North Central Forest Experiment Station Greenhouse, Rhinelander, WI	European larch	Botrytis blight
Potlatch Nursery Cloquet, MN	Red pine	Lophodermium needlecast
	Red pine, white and black spruce container stock	Winter injury and Botrytis blight



Red Lake Indian Reservation Greenhouse, MN	Red pine Red pine Northern red cedar	Root rot- unknown cause Gall midge Spider mites
State of Maine Nursery, ME	Balsam fir	Root rot
Superior NF., MN	Northern white cedar container stock	Springtails
	jack pine	Improper seedling storage
	White spruce container stock	<u>Laccaria laccata</u> fruiting bodies
Toumey Nursery, Ottawa NF, MI	Apple and red oak	Leaf spot-abiotic origin
	White spruce	Damaged scion tissue- unknown cause
	Paper and yellow birch	Heat damage
	Tamarack	Natural needle drop
	White and black spruce	Clorotic shoot tips- unknown cause
ME Western Maine Nursery	Fraser fir	Root rot

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